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# Environmental discourse through a cultural lens: A case study of Guamanians' relationships with nature and wildlife

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# Environmental discourse through a cultural lens: A case study of Guamanians' relationships with nature and wildlife

by

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## ABSTRACT

Guam's natural landscape has noticeably changed over the past century due to increased human activity and introductions of nonnative species. U.S. government agencies and the military have taken steps to mitigate the impacts of nonnative species such as the brown tree snake (*Boiga irregularis*) and coconut rhinoceros beetle (*Oryctes rhinoceros*), both of which have impacted humans directly and indirectly. Previous efforts to control these species on Guam have focused on engaging the community in mitigation efforts; however, little is currently known about the drivers of public support for management efforts on Guam. Moreover, understanding what the public thinks about environmental decisions can produce better policy outcomes with greater public support. Yet minimal research to date has explored this topic or the role of cultural values in Guamanians attitudes toward wildlife, natural areas and the management of nonnative species. This study uses a qualitative approach to understand how members of the public, as well as scientists and natural resource managers, perceive Guam's nature and wildlife. Results provide evidence for dramatically different perspectives between public and expert participants, rooted in difference cultural orientations. Public participants described a significant and mutualistic link between culture and the environment. For participants belonging to more traditional communities, they expressed concerns that environmental changes are affecting their livelihood. Experts expressed a dualistic orientation, characterized by a separation between humans and nature. Finally, descriptions of nonnative species were examined. Public participants used disease-like, militaristic, and hostile terms to describe nonnative species, which echoes Guam's history with colonization, while experts chose to focus on the direct effects nonnative species have on wildlife. This study is the first to explore the role of values in public debate over the management of nonnative species on Guam. Furthermore, it adds to the previous literature by highlighting the importance of cultural values in public attitudes about nature and wildlife.

# CHAPTER 1. INTRODUCTION

Within the past century, Guam's natural landscape has changed due to increased human activity and the introduction of multiple nonnative species (Savidge, 1984). Nonnative species are plants and animals that are introduced outside of their original habitat or range (Binimelis, Monterosso & Rodríguez-Labajos, 2007) and are connected with or blamed for harm to people, native plants and animals, or environmental health. A number of the nonnative species introduced to Guam have contributed to substantial changes to the habitat, native plants and animals, and the culture.

The most dramatic example relates to the brown tree snake (*Boiga irregularis*). This snake was introduced to Guam shortly after World War II, assumingly from a cargo ship (Fritts & Leasmann-Tanner, 2001). Since its arrival, the snake has eradicated 12 of Guam's native bird species (Wiles, Bart, Beck, & Aguon, 2003) and has been associated with negative impacts on several other species, including lizards and bats, on the island (Rodda & Savidge, 2007). For example, wild populations of the Guam rail (*Gallirallus owstoni*), a flightless bird that is endemic to Guam and known to residents as the Ko'ko', was decimated by the snake. The remaining birds are now being raised in captivity.

Despite a massive decrease in the avian population, the brown tree snake's main source for food, the snake continues to thrive on the island by consuming other birds, lizards, and small mammals (Savidge, 1988). By reducing birds that eat insects and seeds, the snake has also increased the spider population and decreased local tree density (Martin, 2013; Stricherz, 2008). Changes to the forest have also impacted culturally important activities for residents, such as hunting for fruit bats and crabs, and the use of medicinal plants. In more metro areas, city infrastructure faces electrical issues because of the density of snakes on the island, causing

power outages (Rodda & Savidge, 2007). Small children are often victims of bites from the snake, resulting in moderate to severe symptoms (Fritts, McCoid, & Haddock, 1990).

More recently, palm trees have become threatened by a new nonnative species, which affects not only the island landscape, but possibly cultural (e.g., local food dishes, roof thatching, basket weaving, and medicine making) and economical (e.g., tourism) aspects as well. The coconut rhinoceros beetle (*Oryctes rhinoceros*) has come to the island and sterilized many palm tree species, specifically the coconut trees (University of Guam, n.d.). Once trees are sterilized, they can no longer produce new fronds, and the dead vegetation is used by the beetle as a place to breed (Marshall, Moore, & Vaqalo, 2016). The beetle has spread to numerous Pacific islands, first with the nearby island of Saipan in 2006 followed by Guam in 2007 (Marshall, Moore, & Vaqalo, 2016). Scientists are finding it difficult to reduce the population of the beetles on the island, which are proving to be resilient to many eradication efforts (Dumat-ol Daleno & Scott, 2015). The coconut tree is an important source of food, traditional housing material, etc. It is also a significant symbol on the island's flag. Thus, similar to the loss of the Ko'ko' bird, the loss of the coconut tree could have important cultural and social implications.

Previous introductions have generated concern among residents and federal and local governments, leading to initiatives to mitigate the damage caused by some of the nonnative species on Guam (e.g., the U.S. military, the University of Guam (UoG), the United States Fish and Wildlife Service (USFWS), and the United States Department of Agriculture (USDA)). Without efforts to mitigate the problems caused by nonnative species on this small island, Guam's island and its unique cultural and environmental resources will be changed dramatically. This change affects the environment – for example, through the loss of plant diversity (Wandrag, Dunham, Duncan, & Rogers, 2017; Rogers et al., 2017) and uncontrolled spider populations

(Rogers, Hille Ris Lambers, Miller, & Tewksbury, 2013). Culturally guided practices of the people who inhabit these spaces will be affected as well.

This study aims to add to existing literature focused on Guam's unique situation by extending knowledge about environmental values residents hold toward their island, and how changes in Guam's forests and environment have affected Guamanians' relationships with nature and wildlife. Understanding a culture and its values provides knowledge into how their social structure is arranged, how politics are formed and conducted, how individuals handle uncertainty, and how individuals communicate, among other behaviors and norms (Daniell, 2014). Previous scholars have suggested understanding the significance of nature and wildlife can shed light on the values and practices within varying cultures (Feindt & Oels, 2005). By understanding what is valued, we can develop a sharper image of a place's socio-cultural background as it relates to the surrounding natural environment, as well as point to ways that communities produce experiences and feelings focused on the environment and environmental change. Identifying and understanding values linked toward a culture's surrounding environment allows us the ability to identify communication pathways and patterns in human behavior that influence sustainable actions and environmental policy – instead of further disrupting stakeholders' continuing way of life.

Using environmental communication as a theoretical framework to understand values placed on Guam's environment, this study examines the words and stories used by various members of the public, as well as experts (e.g., scientists and wildlife managers). A qualitative approached was used to explore how individuals who have an investment in the island's environment – stakeholders – articulate their values, beliefs, and perspectives about the island of Guam, specifically analyzing individuals' relationships with the natural environment and their

perspectives of nonnative species, changes to the island, and attitudes toward efforts to restore the island's natural landscape and wildlife.

## Guam

As the most-west U.S. territory, Guam is often described as the place "where America's day begins" (Bevacqua, 2014). Guam is located 13 degrees north of the equator and 3,000 miles west of Honolulu, Hawaii (Evans-Hatch & Associates, 2004). Measuring approximately 30 miles long and at most 8-1/2 miles wide, Guam is the largest island in an archipelago known as the Mariana Islands (Evans-Hatch & Associates, 2004).

Approximately 160,000 individuals call Guam home (Guam State Data Center & Bureau of Statistics and Plans, 2012). Approximately 37 percent of residents identified as Chamorro, Guam's native people, followed by approximately 12 percent as native Hawaiian or another Pacific island origin, 32 percent as Asian, 7 percent as white, and 1 percent or less for African American, Hispanic or Latino, or another ethnic origin during the 2010 U.S. Census (Guam State Data Center & Bureau of Statistics and Plans, 2012). Approximately 9 percent of the population identified as more than one ethnicity (Guam State Data Center & Bureau of Statistics and Plans, 2012).

The history of Guam and its natural areas is directly connected to the island's military history, which is similar to other colonized societies: one of discovery, destruction, and re-creation in an ongoing cycle never fully controlled by the native people.

Humans first reached the Mariana Islands around 1500 BC (Hung et al, 2011). Artifacts from the area resemble that of pottery from the Philippines dating to the same time (Hung et al., 2011). Rainbird, Alcock, and Dillehay (2004) suggest the settlement of the island chain was "the longest sea-crossing undertaken by that time in human history" (p. 85). The people of the Mariana Islands have a rich history of skilled fishermen providing food throughout the centuries (Kerr,

2011). Archeological evidence suggests a long history of seafood-rich diets (shellfish, turtles, sharks, eel, etc.) as well as fish found inland, birds, fruit bats, and coconuts – the latter had been presumably introduced to the island when humans originally inhabited the space (Rainbird, Alcock & Dillehay 2004; Kerr, 2011; Evans-Hatch & Associates, 2004).

Since the 16th century, Guam has been colonized by Western civilization. The Spanish, being the first to colonize the island, changed the Chamorros' matrilineal society into a patriarchal one with heavy Roman Catholic influence (Hattori, 2004). After the Spanish-American War, the United States claimed control over the island (Hattori, 2004). U.S. military occupation dates back to 1898 when the entire island was considered part of the Navy (Owen, 2010). During this time, residents of the island followed Navy law, which was the beginning of what was considered "oppressive U.S. Naval administration" against Chamorro people (Guam Visitors Bureau, 2018, para. 4, sentence 1; Owen, 2010).

Japan invaded Guam in December 1941 and retained control until 1944 (Guam Visitors Bureau, 2018; Owen, 2010; Thompson, 1944). The Japanese occupation was known to be cruel and violent to many Chamorros, which included placing indigenous people in concentration camps and forcing them to perform demanding labor (Murphy, 2014; Camacho, 2011); therefore, Guam's "liberation" by the U.S. military during WWII initially engendered feelings of patriotism toward the United States (Perez, 2002). During this time in Guam's history, the military worked to Americanize Chamorro people (Perez, 2002), who fell under the law of the Navy once again and were forced to speak English and adopt an American lifestyle (Bevacqua, 2014). While some Chamorro people viewed the Americanization process as a positive experience because the U.S.'s liberation of Guam was seen as "humanitarian" (Camacho, 2005, p. 111, as cited in Viernes, 2009), not all Chamorro people felt this way. Many wished to be given rights that U.S. citizens had, which were not given to the people of Guam under Navy governance (Viernes,

2014). It wasn't until the Organic Act of 1950 that residents of the island were given citizenship and Guam was allowed to have a civil government instead of one run by the military (Viernes, 2014). The Organic Act of 1950 was the sixth petition by Chamorro people for a civilian-run government and rights to be U.S. citizens (Viernes, 2009). It should be noted that despite being U.S. citizens, Guam residents, no matter their ethnic origin, are not allowed to vote in U.S. elections (Bevacqua, 2017).

Despite small strides toward self-governance and independence, Guam residents' attitudes toward the United States and its military presence are mixed (Bevacqua, 2014). Some residents describe unrest and frustration about the lack of concern mainland United States citizens have for the territory (Leon Guerrero, 2017). There are also reports of discontent with the United States' past relationships with the indigenous population (Bevacqua, 2014). Some Guamanians blame the colonization of the island for a loss of Chamorro culture (Peterson, 2016). Recently, contemporary activist groups have been rediscovering and reconstructing lost components of the Chamorro culture in which only clues have been left behind in historical documents (Bevacqua & Bowman, 2016; Peterson, 2016).

**Military presence**

The U.S. military's presence of Guam is ubiquitous. Roadways and streets echo names of military branches as well as naval governors and officers, many of which are located in the capital of the island (Letman, 2016). One-third of the island is occupied by the U.S. Military ("I Tano'-ta," 1994), and the island has one of the highest levels of military recruitment in the U.S. (Letman, 2016). The military presence on the island has been on the rise and will likely continue to grow as the U.S. positions itself against its opponents in the region (Letman, 2016; Licanto, 2018; Panzino, 2018).

There is a spectrum of discourse about military occupation by residents, specifically Chamorros (Viernes, 2009). Those holding office in Guam's government argue the military presence allows the economy to grow on the island, while grassroots communities and other cultural movements believe the military is pressing too far into the already-crowded island (Viernes, 2009).

Two large U.S. military bases take up a third of Guam's land space (Perez, 2002). Andersen Air Force Base is located in the northern corner of the island and Naval Base Guam is located Southeast of Guam's capital, Hagatna. Over 8,000 U.S. veterans are permanent residents of Guam (Kromer, 2016). The number of veterans living on Guam is nearly 12 percent higher than the Northern Mariana Islands (Rota, Tinian, and Saipan) (Kromer, 2016). The Air Force Overlay Unit is situated just south of the Ritidian Unit and is part of Andersen Air Field (Guam National Wildlife Refuge & the United States Fish and Wildlife Service, 2009). Much of this area is not open to the public. The Navy Overlay Unit protects areas of land in the northern, central, and southern quadrants of the island (Guam National Wildlife Refuge & the United States Fish and Wildlife Service, 2009).

## Efforts to control nonnative species on Guam

Land management and wildlife management decisions on Guam are influenced by the military. Today, the Guam National Wildlife Refuge is operated by USFWS and is overseen by three units: the Andersen Air Force Base Overlay Unit, the Navy Overlay Unit, and the Ritidian Unit (see Figure 1) (Guam National Wildlife Refuge & the United States Fish and Wildlife Service, 2009). The refuge spans nearly 23,000 acres ("Guam National," 1994). The Ritidian Unit is located at the northern tip of the island and has over 385 acres on land and 832 acres offshore (Guam National Wildlife Refuge & the United States Fish and Wildlife Service, 2009). This unit focuses on recovering endangered species, such as the Guam (Mariana) swiftlet

(*Aerodramus bartschi*), Guam Micronesian kingfisher (*Todiramphus cinnamomina cinnamomina*), Green turtle (*Chelonia mydas*), Mariana fruit bat (*Pteropus mariannus*), Guam rail, etc., and works to control damaging nonnative species such as the brown tree snake (Water

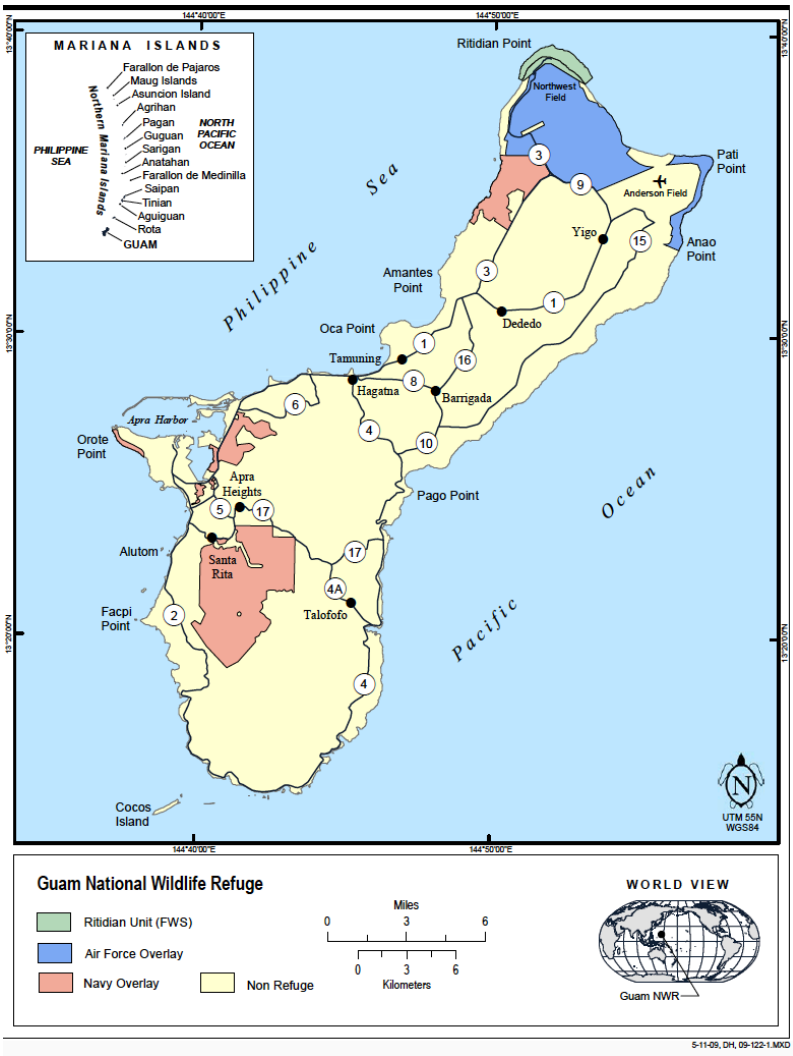


Figure 1: Guam National Wildlife Refuge & USFWS, 2009

& Environmental Research Institution of the West Pacific & Island Research & Education Initiative, n.d.; Guam National Wildlife Refuge & the United States Fish and Wildlife Service, 2009).

Coconut rhinoceros beetles, snakes and non-native plants have been the target of management campaigns carried out by the U.S. military, the University of Guam, USFWS, the United States Department of Agriculture, among others. Examples of pest control include instructions for locals to learn how to make their own beetle traps (Iriarte, Quituqua, Olympia, Moore, & Sanders, 2015), as well as homemade pesticide wands (Iriarte & Quituqua, 2015). Previously, the virus *Oryctes nudivirus* was used to manage the coconut rhinoceros beetle (Marshall, Moore, & Vaqalo, 2016), but the beetles are no longer affected by its use (Dumat-ol Daleno & Scott, 2015).

The brown tree snake has shown the same type of resistance against the government's efforts to reduce their population. The military bases on Guam check their ships and aircraft for snakes before and after they land (Brisbin, 2015; Tucker, 2011) and the international airport and public ports practice the same. The USGS set up a multiagency rapid response team on "recipient" islands where outgoing transportation from Guam ports or lands (USGS, 2015). This was put in place in case a brown tree snake is accidentally transported to another island (USGS, n.d.) – marking the seriousness of the potential impact of the snake on an island system. Traps are observable from the streets, hanging on fences and trees (personal observation). Workshops help Guam residents know what to do when they see a snake on their property (Tano, 2018). The U.S. Department of Agriculture and Wildlife has been testing an eradication method where dead mice filled with acetaminophen are dropped into the forest to assess the lethality of the medicine on snakes when ingested (Williams, 2013; Tano, 2018).

The USGS is working to keep the small number of Mariana swiftlets – located in caves within Naval Base Guam – alive by placing traps for brown tree snakes outside cave openings (USGS, 2015). However, some snakes evade the trap and are able to make it inside the cave openings (USGS, 2015). Efforts are also being made to increase the native bird population for those being raised in captivity, such as the Micronesian kingfisher and Guam rail, known to its residents by

its Chamorro name, the Ko'ko' (Sablan, 2018). Current goals are to raise the population of the Guam rail to 2,000 and the Micronesian kingfisher to 1,500, but this will be impossible to accomplish without the eradication of the two birds' biggest predator, the brown tree snake (Guam National Wildlife Refuge, & US Fish and Wildlife Services, 2009).

The U.S. Department of the Interior announced in early 2017 that they provided $3.5 million to control and prevent the spread of brown tree snakes, of which 400 were caught and killed between January 2017 and March 2017 (U.S. Department of the Interior, Office of Insular Affairs, 2017). In 2018, $2.5 million was given by the DOI in an effort to keep fighting the issues brought on by brown tree snakes on Guam, including a community engagement program to gain public support and action toward the snake's eradication (Joshua, 2018). Other restoration efforts funded by government entities have focused on including the community in natural resource management efforts, such as monitoring the health of coral reefs (National Oceanic and Atmospheric Administration, 2017). Despite the efforts put out by government organizations, little information is available about the impact these programs have had on wildlife restoration. Minimal information is known about community engagement outcomes of such programs.

While federal and local agencies have provided resources to eradicate the nonnative species in an effort to slow long-term consequences to the island's ecosystem, residents of Guam feel they are rarely directly engaged in management actions (Wald, Nelson, Gawel & Rogers, 2018). There is evidence to suggest that Guamanians are interested in participating in efforts to protect the environment. For example, Grafeld et al (2016) asked SCUBA divers who swam in Guam's coral reefs if they were willing to donate money to protect the reefs. A majority of divers said they would support the reefs with some money, but more Guam residents were willing to pay than nonresidents, as well as those who interacted more with the coral reefs (Garfield et al.,

2016). Guamanian residents regularly expressed an interest in citizen-driven action to control non-native species (Wald et al., 2018). These two studies highlight the importance of understanding how the public values their surrounding environment and how these values are related to public support for conservation initiatives.

In addition, values are linked to perceptions of culture of a place, which is important to understand because misunderstandings can lead to biases within conservation practices – ultimately leading to unsuccessful results (Close, Fitzpatrick & Li, 2011; Warner & Kinslow, 2011) and because these perceptions influence people's willingness to help the environment (Grafeld et al. 2016). So far, little focus has been given to the values Guam residents place on their changing environment. This thesis seeks to address this gap by exploring the social, environmental, and historical contexts guiding differences in stakeholder attitudes about nonnative species on Guam.

# CHAPTER 2. LITERATURE REVIEW

## Environmental communication

This study will examine the discourse used by participants when speaking about Guam's environmental challenges. Studying language use allows us to begin to understand the relationship between person and nature, and person and person (e.g., public vs. scientists). Through language, we can begin to understand an individual's values and beliefs regarding the phenomenon they are communicating about. By studying the discussion between individuals within the same space, we are able to examine the encoding and decoding processes in which meaning is manufactured. Encoding and decoding are the processes of creating meaning, where encoding lets a person put their interpretation of the world into, for instance, words, and another person will interpret, or decode, the words and attach meaning to them (Hall, 1997).

Yet communication is more than a linear act of transmission and simple interpretation of messages. We build a sense of our surroundings and culture through language. Communication is interwoven into our every action and relates itself to the specific places we interact with (Carbaugh, 1996). We "create spaces" by learning about them, which, in turn, builds us – our identity – by understanding our connection to the environment, and by fostering values and perceptions of the space (Cantrill, 1998, p. 304). Basso (1996) describes this phenomenon as the place "speaking" through people: "[The space is] animated by the thoughts and feelings of persons [in] them, places express only what their animators enable them to say" (p. 108).

The meanings induced from communicative practices within an unfamiliar setting will differ from an area that holds personal meaning, which is influenced by the social, cultural, and historical impressions left in the familiar space (Carbaugh, 1996). For example, participants, as will be discussed in chapter 4, recounted stories of Chamorro history told by older family

members – which they, in turn, shared with their children – in specifically identified places. This recounting is a form of sharing important values linked to the specific natural places in which the communication practices take place, and are woven through their communication practices with us, the researchers.

Because this study focuses on a U.S. territory located with mixed populations from U.S. and Asian countries, it is imperative to discuss how there may be a dichotomy in environmental perceptions that are influenced by competing environmental ontologies, such as a mutualist and dualist orientation. Mutualists view people and nature as interwoven – bound together – while dualists separate the two entities. Debelo, Legesse, Milstein, and Orkaydo (2017) show how mutualism and dualism materialize – in their case study, between older and younger generations – in the indigenous Gedeo people of Ethiopia. Younger Gedeo generations see the traditionally rooted phrase, "tree is life" as commodity-driven while older generations' perceptions which are rooted in traditional understandings that people "cannot exist detached from the land and, by giving the land what it needs, the land is encouraged to provide what humans need" (Debelo et al., 2017, p. 7). It is possible this same dichotomy can be seen on an island with drastic environmental changes in the last half century, such as what has been seen on Guam.

Responses to environmental changes have been dominated by the U.S. government, making it imperative to understand how perceptions may differ between Guam residents, especially with Chamorro heritage stemming from the Pacific, and residents who have come from Western cultures. Often, Western culture's perception of the environment is laid out separately from being human; it is a separate entity, or a dualist orientation (Milstein, 2011; Debelo et al., 2017). This separation is not the case for other populations. For example, Milstein (2011) found varying discourses in whale tourism, where tourists saw the whales as separate from their personal

experiences, and those working in the industry saw the whales as being part of their being, stating the importance of helping and nurturing the whale population the tourists are seeing.

Previous studies have found that even within the same area, communities can have divergent values about the environment and the management of non-native species. A majority of nonnative species conflicts come from variances in values (Estévez, Anderson, Pizarro, & Burgman, 2013). This can be based off, for example, whether the industry surrounding communities relies on environmental resources (Berninger, Kneeshaw, & Messier, 2009). Perceptions of nonnative species may also vary within a society based off the role they play, such as someone from the public who interacts little with nature versus someone who interacts heavily with it, such as an ecologist, scientist, or wildlife manager.

Selge, Fischer, and van der Wal (2011) found differences in what the public believed were environmental issues in Northeastern Scotland versus experts (ecologists and management), citing pollution, tourism, human-induced climate change (to name a few) while ecologists named environmental problems closely related to their current work. Even when the focus is on the same problem (e.g., nonnative species), perceptions may differ because of differences in language, values, experiences or species (Schüttler, Rozzi, and Jax, 2011). Difference in perceptions of the value of native and established nonnative species have also been connected to differences in experiences with these animals across multiple generations (Schüttler, et al., 2011; Estévez et al., 2013).

Different groups can exhibit differences in the language used to describe a nonnative plant species. While individuals in management positions tended to use militaristic descriptions and combative language when referring to the plant, indigenous individuals used neutral language to express their feelings toward the plant (Bach & Larson, 2017). Militaristic tones have been used to describe nonnative species in other studies as well. Druschke, Meyerson, and Hychka (2016)

claim that early papers about nonnative species tend to have military language used to describe their "invasion" of an environment but found other cases where management did not take on such a tone. When viewed together, both studies provide evidence of the complexity of language within varying cultures, which highlights the need for a better understanding of the discourse surrounding the management of nonnative species and how this discourse intersects with personal experiences, culture, and worldviews.

## Theory of culture

The study of culture has created various, sometimes conflicting, perceptions of what culture is. According to Thompson, Ellis, and Wildavsky (1990), one common model assumes that culture is created from "mental products," which they define as values, beliefs, norms, symbols, ideologies, etc. (p. 1). Alternatively, other scholars suggest that culture is created from the way individuals outwardly interact with one another on a more individual basis (Thompson et al., 1990). What maintains a stable culture is the act of passing down cultural knowledge from one generation to the next, explicitly or implicitly (Manfredo, 2008). What remains common among the varying definitions of culture is the idea that to have a culture, a group must have shared meanings (Hall, 1997). Meanings are traded between individuals within the same group, allowing a similar meaning to form between all members, placing the surrounding world into perspective (Hall, 1997). When using a more anthropological approach to culture, we begin to understand the term as a "'way of life' of a people, community, nation or social group" (Hall, 1997, p. 2). For the purpose of this study, we will draw on Cultural Theory, created by anthropologist Mary Douglas, to understand the idea of culture.

According to Douglas (1996), culture can be measured based on two dimensions: *grid* and *group*. Grid and group are often referred to as the "two dimensions of sociality" (p. 5) which lead to defining a culture's *way of life* (Thompson et al., 1990). *Ways of life* are a mixture of social

relations (interpersonal interactions) and cultural bias (shared values and beliefs) (Thompson, et al., 1990, p. 1). In other words, a *way of life* is defined through the mental products and the interactions of individuals in a given culture. Both dimensions are combined on a two-dimensional model to show the relationship between the grid and group. In the two-dimensional theoretical model, the y-axis shows the impact of grid and the x-axis shows the influence of group (Figure 2). For instance, group may have a stronger affect in certain cultures than grid, or both may have a strong or weak affect in a given culture. *Group* is defined as a "unit" of "bounded" individuals (Douglas, 1996). In other words, the group dimension can inform how much a culture relies on the formation of group boundaries to function. The amount of *grid* shows how individuals relate with members of their own groups and those who occupy different groups (Douglas, 1996). Combining both dimensions allow scholars to understand how individuals interact with others in an acceptable manner. Wildavsky (1987, p. 6, as cited in Mamadouh, 1999) further simplified both dimensions as the following: the group tells an individual who they are and the grid defines how they should behave in society. The model helps to illustrate where different societies lie on the continuum of group and grid and how their position relates to different ways of life, also known as culture types. Douglas (1996) generated four ways of life: hierarchy, egalitarianism, fatalism, and individualism. Some scholars have argued for a fifth, autonomy (Mamadouh, 1999). Following is a brief overview of each way of life, including each's stance on the environment:

**Hierarchy**

Individuals who fall somewhere in this quadrant (high group and grid) are held by "strong group boundaries and binding prescriptions," where collectivism is valued over individualism (Mamadouh, 1999, p. 400). There is a certain controlled order to this way of life, in which each person has a specific role to play. Civil disobedience is frowned upon, including protests and

demonstrations as well as disrespect for authoritative figures (Dake, 1991). Social relations (Thomspon, et al., 1990), are guided by a strong set of societal skills. When thinking about the environment, hierarchists believe the environment should be controlled because it has limits to what it can do in relation to society (Manfredo, 2008).

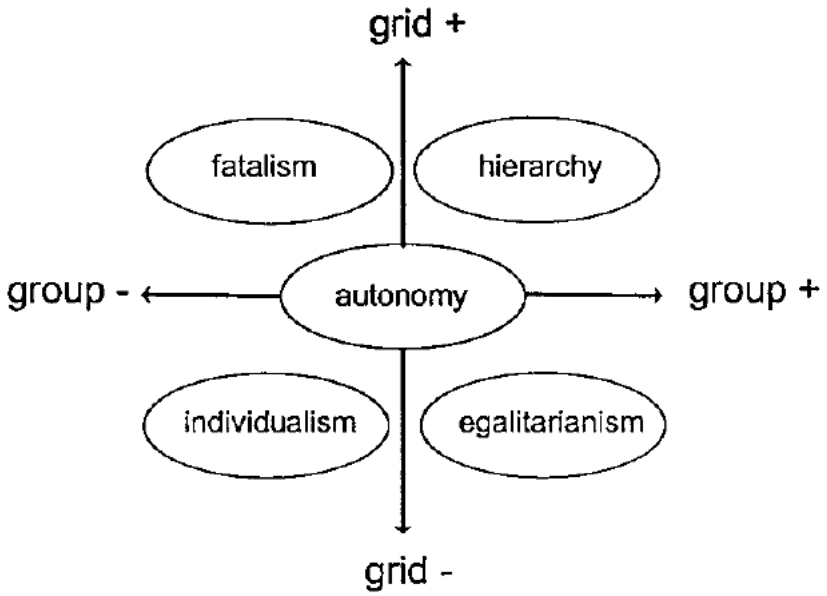


Figure 2: The ways of life, also known as culture types, can be used to measure worldviews between different cultures (Thompson et al., 1990).

**Egalitarianism**

This high group, low grid quadrant is built on equality with little group authority (Mamadouh, 1999). Each person has a role to play, regardless of their age, gender, race, ethnicity, religious background, etc. (Mamadouh, 1999). Societies that fall under this way of life believe in the betterment for all. Studies show advocates for the environment tend to fall under this quadrant because they believe the environment is "fragile" (Manfredo, 2008). They do not like environmental risks and prefer to reduce harm that may occur to the environment (Dake, 1991). Based on their perception of nature, egalitarians dislike the way hierarchists and entrepreneurs believe nature should be managed because of nature's fragile state—hierarchical and

entrepreneurial culture types will only add more strain to the environment, not truly help it (Manfredo, 2008, p. 171).

**Fatalism**

Fatalists, who are high grid and low group, believe much of what happens is left to fate (Mamadouh, 1999). Those who live in this culture isolate themselves by their own choices and are excluded from hierarchal organization (Mamadouh, 1999). Just like they observe with life overall, they believe the environment is hard to control because of its dynamic, unpredictable nature (Manfredo, 2008).

**Individualism**

Sometimes called the "entrepreneurs," individualism characterizes a culture of individuals who are not strongly bound by groups and are controlled more so by him- or herself than others (Mamadouh, 1999). These types of cultures have low grid and group, leaving them free to move around different groups and interact in a way they find most beneficial (Mamadouh, 1999). They believe each individual is responsible for their own success and do not care what policies are implemented as long as they do not impede on their ability to thrive (Dake, 1991). "To each their own" would be their motto, especially when it comes to the environment. Individualistic societies do not believe people need to interfere with nature because it is robust and can recover on its own (Manfredo, 2008).

**Autonomy**

Some scholars argue for a fifth dimension, which is usually added when the map moves from a two-dimensional map to a three-dimensional map. In the fifth quadrant, placed in the middle of the map with no grid or group, the individual is autonomous and does not often interact with others (Mamadouh, 1999). Sometimes this way of life is called "hermit" because of its isolated nature (Mamaduoh, 1999).

Cultural Theory suspects meanings to be collectively constructed instead of on an individual level, leaving little to be explained for individuals who are part of the same culture but deviate from the norm (Douglas, 1997). As Tansey and O'Riordan (1999, p. 75) describe, "Cultural Theory makes no attempt to account for differences in individual perceptions of nature." Therefore, seeking out perceptions and feelings of different groups on Guam will lead to insight into how they value their surrounding environment.

Multiple generations on Guam have experienced nonnative species, the loss of culturally and environmentally important bird species and plant species such as the decline of the coconut tree. In addition to Cultural Theory, I will explore how changes in Guam's forests and environment have affected "ways of being placed with nature, in it, as it, ways of being within the natural realm" (Carbaugh, 1996, p. 38). Specifically, this study seeks to understand how shifting environmental circumstances and opportunities to be with and in nature on Guam have influenced residents' discourses of conservation, expressed relationships with nature, and attitudes toward nonnative species. Furthermore, I will explore how discourses about nature, wildlife and the environment differ between stakeholders with very different backgrounds and relationships with nature, with the expectation that there may be evidence of divergent paradigms of mutualism and dualism on the island. A complicated history of colonialization, affiliation with the U.S., and invasion on Guam are likely to result in perspectives of wildlife that differ from mainland U.S. residents and between traditional and conservationist communities. By drawing from environmental communication as a theoretical framework, I will examine how cultural values and worldviews are expressed and explicated through the specific discourse used by each group, allowing me to identify their perceptions of the intrinsic value of wildlife, nature, and conservation efforts on Guam. Specifically, this study aims to answer the following questions:

1. What values do residents of Guam place on their island's natural environment, including the island's wildlife, nature, and conservation efforts?
2. How do residents of Guam describe their natural surroundings and those who are working on the island's environmental issues?

# CHAPTER 3. METHODS

Data for this study was collected from July 2017 to March 2018. One member of our research team was already on the island and began recruitment efforts several weeks in advance of the scheduled sessions. Her familiarity with the island and its people was beneficial to recruitment efforts. She identified community centers, mayors' offices, and stores where we could recruit participants and post flyers about the research. Recruitment flyers included information about the topic, the locations and times of the sessions, as well as contact information for the moderator of the session, Word-of-mouth was also to recruit participants for this study. Therefore, some participants were recruited in person and on Facebook, and many of the participants were acquainted with researchers on our team.

For this study, I analyzed transcripts from small group interviews with residents of Guam. This method of data collection was part of a larger research project, but beneficial to this study because of the intimate sessions with many people who were familiar with our team members or with each other, creating a safe area to share thoughts about Guam's environmental changes and the people working to mitigate negative outcomes from those changes. We were also able to move to multiple public areas to speak to varying members of the public. The individuals who are used in this study were chosen because they interacted with the environment at a moderate level, whether that be because of a profession, for their livelihood, or recreational purposes. This means they have more of a stake in the island's environmental changes and may be more inclined to express their thoughts as they are related to the study.

Participants fell into two groups: public members from traditional communities (hunters, fishers, and medicine women) and experts (scientists, educators, students, and managers whose professional position focuses on issues with Guam's environment). Participants ranged in age

from 23 onward. Some members were affiliated with the U.S. military, and few obtained more than a high school education. Participants included white and nonwhite participants who have lived on Guam for a decade or more. Many came from surrounding small islands or the Philippines, and a few came from the continental U.S. Twelve groups with a total of 49 participants will be analyzed in this study: 30 belong to the general public and 19 are affiliated with the expert group; 25 participants were male and 24 were female; 7 participants were in the age range of 18 to 30 years of age, 29 were between 30 and 60 years old, and 13 were 60+ years old.

Participants were asked questions designed for a larger research project focused on the human dimensions of nonnative species management on Guam; however, these questions are relevant to this study's topic. The interview script was designed with structured questions (see Appendix B for the full script), which allowed us to obtain specific and uniform answers from each session. We allowed for some diversion in cases where an unexpected but relevant topic surfaced that warranted greater exploration.

Themes explored during our interviews include the participant's personal experiences with the jungle, with nonnative species, and with natural wildlife management. We also asked questions about trusted sources and consequences of leaving invasive species unchecked.

This research was approved by ISU IRB #17-266. Each small group interview was recorded with a primary digital audio recorder and a backup recorder in case the first malfunctioned. Files were then moved to a computer and uploaded to a secure cloud website. Files were deleted from the audio recorders before leaving the islands to protect the identity of the participants. In accordance to the IRB application, participants' names have been removed from the final study to protect their privacy. Any identifying factors have also been removed. Interviews were transcribed by Rev.com, a third-party transcription service.

## Analysis

This study utilized grounded theory. This method is appropriate because very little is currently known about the relationship between nature and individuals on Guam. Due to Guam's unique wildlife composition, history, and military presence, it is best to let the data guide and develop theoretical boundaries for this line of questioning. Grounded theory also has the power to provide a deeper understanding of what is being studied as well as "provide a meaningful guide to action" for those who wish to apply the study to a real-world situation (Strauss & Corbin, 1998, p. 12). Grounded theory provides a conceptual foundation for the discursive position regarding invasive species on Guam. By understanding the discourse surrounding invasive species, we can better understand the cultural implications of nonnative species and the impact of environmental change on Guam residents.

As is suggested by notable scholars (Strauss & Corbin, 1998), I started my analysis with a clear, open mind for coding, waiting for patterns to present themselves within the data, and not creating preconceived notions about what I would find. Data is used as the foundation to build a study by creating "ongoing plans" to form research questions and leaving the research to inform the outcome (Heath & Cowley, 2004, p. 141). This allows the data to set the boundaries in cases where little is known about the research problem. Grounded theory does not focus on creating a broad general theory (Strauss & Corbin, 1998), which is not the purpose of this study. This study's aim is to add to the larger works focused on ecocultural discourse, specifically within island systems. It is meant to add or build on concepts (Glaser, 2010), not create new theory.

Because the history of Guam has a complicated history with Western colonialization, as well as knowing very little about the roots of their Chamorro culture, I believe it is important to keep weight in the island's history and current setting. Therefore, this study relies heavily on the cultural background of its participants to construct findings from the analysis. This approach to

the data relies on a variation of grounded theory known as constructivist grounded theory (Charmaz, 2016). Charmaz's variation places emphasis on the "historical, social, and situational conditions" of the participants while also sustaining the original grounded theory's practice of the phases of coding as well as memo-writing and theoretical sampling (Charmaz, 2016, p. 35). In other words, this approach follows traditional grounded theory while including the role of the researcher and the process through which she reaches her findings (Martin, Scott, Brennen, & Durham, 2018). It is important to recognize the bias a researcher brings into an analysis of a phenomenon no matter how familiar she is with it.

In contrast, this method is also meant to understand how the researcher, in this case, myself, will have experiences and world views that will be influencing my analysis, and also realized previously (Charmaz, 2016, p. 36). For example, my experiences are based on my Midwest background; therefore, my worldviews will differ from those who live in Guam, despite the fact we may share U.S. citizenship (to some degree). By remaining aware of how our perceptions can affect the outcome of the analysis, we are better able to search for an understanding that is not assumptive of our preconceived notions. Reflexivity is not a weakness but a recognition by the researcher that the "truth" is conditional to the environment in which the researcher lives (Martin et al., 2018). While this approach to analyzing data uses constructivist measures, systematic review and organization of the data allows grounded theory to remain a scientific form of analysis (Strauss, & Corbin, 1998).

**The emerging categories**

As mentioned earlier, grounded theory allows the data to speak first and forge themes from what is being said. Keeping this in mind, I began the analysis with a clear, open mind to what the data would provide. I did not separate participants by their label of traditional community and expert – that was done at a much later stage in the coding. I wanted to look at all participants'

responses together to understand what was being said. The first step in the analysis focused on closely reading a few transcripts for the study. Reading a few of the transcripts allowed me to develop eight rudimentary categories. These categories were based off patterns of descriptive words and phrases that expressed emotions or depicted imagery and specifically targeted a group of people, species, or nature in some form. I began with the following categories: *perceived cultural impacts*, *word use toward nonnative species*, *perspectives toward the environment*, *perspectives toward others on the island*, *residual colonialism*, *communication practices*, *descriptions of nature*, and *pride in nature*. These categories were based on action codes from line-by-line coding of what I was interpreting from the data was used during all close readings. This approach followed a similar pattern to Glaser's method of analysis (Charmaz, 2006). Memo-writing, keeping a record of thoughts, feelings, and comments about the process of analysis, was ongoing via annotations in NVivo and through Google Docs and not just during the first stage of coding (Birks, Chapman, & Francis, 2008).

During the second stage of analysis, the rudimentary categories are chiseled away to create more solid and concrete lines, as defined by the action codes (Charmaz, 2006). This is an important step in the coding process because coding has moved into a deeper level of analysis, theorizing what the data has set out before the researcher (Charmaz, 2006). Theorizing is not the same as creating theory. Instead, the focus was to take the codes and shift them from units into broader schemes using a systematic and explicatory approach (Strauss & Corbin, 1998).

For the second stage, I chose to take the action codes in NVivo and sort them into two major themes. This helped me realize the eight categories above and later refine them in the next phases of analysis. I combined *residual colonialism* and *communication practices* with *perceived cultural impac*ts to create the new category of *perspectives of "us" and "others."* At this stage, I began to look at how participants described their communities or other groups to understand

which participant landed in which role. I also created a second category by combining *descriptions of nature*, *pride in nature*, and *word use toward nonnative species* with *perspective toward the environment*. It was my goal to keep myself out of the analysis as much as I could and combine smaller categories into larger themes. Yet, my wish to stay objective also clouded my ability to understand where these frames created by the dialogue of the participants were coming from. It is an integral part of the constructivist grounded theory approach by allowing the researcher to see how her experiences are affecting the analysis (Charmaz, 2016), even if it means you are not inserting yourself enough by engaging with *why* the patterns are forming.

It is also important to remember the reflexive properties of grounded theory at any stage, especially when beginning to create categories. Allowing the process to remain emergent means removing preconceived notions from the body of work (Corbin & Strauss, 1998; Charmaz, 2006). As mentioned earlier, preconceived notions can be removed and recognized through the use of memos. As someone who has not lived outside the Midwest U.S. and has had little travel experience, it is important to keep my bias and cultural perspectives in line with what is being interpreted in a complete different geographical and cultural area of the country.

Returning to my data, I found my two major themes to be lacking the context and ability to be informed by the history of Guam. Therefore, I decided to revise my two themes once again. This time, I reinterpreted *perceptions of community and others* into a theme called *mixed cultures*, and parsed *perspectives toward the environment* into three categories: *loss of cultural imagery*, *cultural spaces*, and *species discourse*. The patterns of *word use toward nonnative species* began to align with similar studies also focusing on descriptors of nonnative species, which led me to keep the category but change the name to *descriptions of nonnative species*. Other categories, however, were not the final form of my findings because they were missing some of the key concepts insidiously walking around each theme's border. After careful feedback from other

researchers, and more time carefully analyzing participants' discourse, I am sharing some of the themes which emerged and are relevant to this study's purpose. These are the themes presented in my results.

# CHAPTER 4. RESULTS AND DISCUSSION

After carefully prescribing to grounded theory by letting the data speak for itself, it was clear that culture was a significant factor for the traditional communities. Originally, Douglas' Cultural Theory seemed to fit the mold for how participants spoke of themselves, how they viewed the environment, and how they saw other groups and their views of the environment. I cover some of those similarities below.

Participants from both expert and public groups spoke of the significance of community involvement. Community engagement was often brought up as a solution to environmental issues. Participants expressed the need for community members to assist in the restoration of the island's natural health, stating that people "want to take care of the island." This language, and the emphasis on community action, is consistent with the egalitarian or communitarian culture type. According to Cultural Theory, egalitarians view groups, regardless of age, gender, class, race, as equal, assuming everyone has a part to play in making their society better as whole (Mamadouh, 1999). For example, one participant spoke of "everyone" getting involved to make Guam better, another suggested investing in the future by investing in kids and others on the island, and a separate participant explained it was important to invest in the community because it would make "a better society of informed citizens to make better decisions and better choices" (47).

While findings suggest both groups have egalitarian values, a few individuals deviated from this perspective by taking on what Cultural Theory calls fatalistic world views, claiming "it's too late" to fix problems with nonnative species because "there's nothing that can truly be done" (48). Another member of the public showed hierarchical perspectives, which involve controlling

the environment because it is limited (Manfredo, 2008): “There’s not enough resources. Limited resources. It's a finite supply” (36).

These crossovers suggest individuals can hold more word views than the ones they are prescribed by the rigid grid-group typology laid out by Cultural Theory scholars. As Milstein, Anguiano, Chen, and Dickinson (2011) suggest, “Just as no one culture is homogeneous or static, no cultural view of nature will be uniform” (p. 480). In other words, cultures are made of mixed historical and sense of identity and community backgrounds which provide varying forces depending on where you physically and socially are within the society (Milstein et al., 2011). The themes that emerged from this study pushed the boundaries of Douglas’ theory, encouraging me to broaden my theoretical framework. For example, participants took time to express their views of tourists, the federal and local governments, environmental agencies, and the military. Yet their perspectives of others are based off experiences from specific places on the island, or specific dates. There was little description from participants of actions that could inform us of the world views of these groups, and that is not the focus of this paper.

Instead, after realizing much of the conversations were based off settings and specific experiences, connecting concepts to other ecocultural frameworks became clear. Concepts pulled from ecocultural discourses can be used to examine how different groups use language to describe shifting environmental circumstances on Guam, changes in relationships with nature, and attitudes toward nonnative species.

## Tradition and history

The island of Guam is no stranger to the introduction of culture, and its reinvention of island culture through the centuries. Those of Chamorro descent had their cultural traditions stripped by those who colonized them. Yet, pieces of their history remained through the ongoing verbal

storytelling linked to specific natural spaces. These spaces were described as spiritual and places to transport participants back to when ancient Chamorros moved across the landscape.

A group of participants who heavily interact with the environment through fishing shared accounts of what happens when the environment is disrespected.

> "But the area [the forest] – when you enter the area [forest], sometimes you need to ask permission." (1)

According to this group, permission must be asked before altering the landscape, such as tainting the area with bodily fluids, otherwise the person will experience negative consequences. The participants agreed that it is "better to be safe than sorry."

> "We have one guy here that became really sick, see [name redacted] – remember [name redacted]?" (1)
>
> "Yeah." (3)
>
> "Yeah, and he lost – I wish he came here and tell you his experience -- but he went to the jungle, I think he came out -- I tell you he was in the hospital for almost a month. So, he is just finally gaining weight and everything, by from before 195 to I think 145. He lost 50 pounds. He was really sick." (1)

This was not the only mention of spiritualism connecting to landscape. Another group of participants are known as *suruhanas*– people who practice the traditional Chamorro art of making medicine from the native plants on the island. These individuals learn how to make medicine through the passing of knowledge, through identifying, collecting herbs and caring for them once they are in the suruhanas' possession. These participants describe their healing as a spiritual act that gains its potency from natural forces such as the sun.

> "I believe in herbs, I believe. For the people that I heal, they really ... And it really works. '[A client], how many years you don't walk?' I do let her walk, by my hand." (29)

For the suruhanas, they described the herbs they use as spiritual in nature, a contrast, they acknowledge, from the way Westerners view the herbs. Rosemary was an example brought up to illustrate the differences between Western and Chamorro cultures. One participant described rosemary being used to season chicken for Western culture, but she describes it as a "sacred plant" used for "spiritual healing and cleansing."

These examples provide evidence of a mutualist orientation – human and nature being part of each other instead of two separate entities. Participants who are members of the traditional communities on Guam interact heavily with the environment, and, in doing so, fostered respect for the land, understanding its providing nature for them, as well as their role in utilizing nature to have their culture thrive. Asking for permission to enter a space is a sign of respect, as well as is the act of acknowledging the power of the native plants to heal, when treated properly.

This give-and-take perspective with the environment can also be manufactured through the connection individuals have to specific places. Milstein et al (2011) calls this concept a sense of relations in place. This concept allows us to examine the relations people in a specific setting have to their natural surroundings through the way they communicate about the environment. The peoples' relationship with the environment is unique to the time it is set in, as well as the people who are, at that moment, part of the environment – those who are experiencing it in that time.

What we can know about the participants of this study comes from their choices of how they wish to communication about their relationship with the island's nature and wildlife. Members of the public in this study often reflected on ancient Chamorro culture to describe their previous experience with areas they described as pristine (i.e., a place with native trees species or the way nature on the island might have looked originally). Carbaugh (1996) described sense of place as "evok[ing] a communal history of entire sagas or tales that radiate from that very place (thus

looking backward into time)" (p. 41). Looking back in time and the evocation of Chamorro history was common among participants who are part of traditional communities. These reflections are commonly associated with positive experiences participants have had with the space, and feelings of wonder. Members of a public group identified ancient Chamorro paths they use to go hunting and reflected on what these paths might have been used for.

> "I mean, I sit there, and I just envision how our people lived during that time. How they went into the water. There's certain areas where it's [deep]. You walk down and you just jump right into the open blue. If the water is calm, that's the way they entered and exit because all the other areas, like I said, was nails, but that area is just smooth, like people have been walking always through that area. It survived the test of time because even up to now, all the typhoons, the trails are still there. The latte [stone] is still there." (27)

This group also had a discussion about why there are villages on certain parts of the island – the Chamorro established them long ago because of the "prized" fish that could only be found in the water around the edge of the island. And they fought off others because they understood the "precious resources" these areas of the island held. Depictions of colorful fishes with varying colors and forms were accompanied by hints of historical placement and folklore.

For example, participants implied Chamorro knew long ago, before the Spanish came and colonized the island – shaving away at their island's culture – that their people were knowledgeable about the island's unique features and how to obtain them. Participants implied Chamorro knew how to work with culture by smoothing down robust trails that cut through jagged rock formations and are still used today.

> "I used to go there and hunt coconut rat, and you'll know if you're on the path because if you're off path your shoes will get all jacked up because the rocks are like nails, but if you're on the right path you can actually freely walk alongside all the way to Two Lovers

> Point. When I go there, I can sense that there is in fact a lot of usage back in the ancient Chamorro time because who would make those rocks that smooth? Unless it's been trampled on and walked on by ancient folks way back, and so there are areas there that I see those kind of trails. That's a good area." (25)

While this participant frames traces of Chamorro culture as a positive experience (e.g., "right path" and "good area"), they also mention a "good area" is an area that has been "trampled on," possibly by "ancient folk." This suggests that human interaction with the environment is a positive force, or one that is in harmony with nature, while most contemporary human interaction was associated by all groups with negative consequences.

Members of the public describe the importance of oral storytelling in order to keep an incomplete history of Chamorro people alive. Much of their descriptions surrounding retellings of the origins of villages and paths on the island, along with landscapes such as the coconut trees, rely on the ability to pass these stories through their families. Members of the public often mentioned their parents telling them specific information about environmental changes or Chamorro ways of life. A few members also briefly mentioned passing these stories onto their children, some even taking them to the spots the stories reference. . This type of storytelling is similar to what has been found in other studies focusing on environmental communication via the sense of place construct (Debelo et al., 2017; Basso, 1996; Carbaugh, 1996). Yet, not all participants used storytelling to connect to an area.

**Diverging identities and values**

As the 20th century moved on from war, Guamanians began to fight for their self-identity, U.S. ideals began to infiltrate Guam's culture. As the island grew into a strategic military site, people with Chamorro identity began to experience a question of identity: Do we diverge from our (lost) Chamorro culture to take on a new identity as (almost) American?

Bevacqua (2010) states the military offers Chamorro people a chance at an American identity in replacement of their indigenous one – one that comes with rights and a secure job. Guam has one of the highest enlistment rates in the U.S. (Letman, 2016). Becoming a member of the U.S. Military includes opportunities for job security, stable wages, job relocation, and education reimbursements (Harden, 2008). His argument implies what might be an underlying factor for why some participants prefer to communicate in another form: the infusion and influx of Western culture creates various frames of environmental communication among Guam residents.

Many experts, who work for a government agency or are Western-style educators, chose to communicate in another form, separating themselves from the environment. The environment was depicted as a separate entity, one that could be viewed behind glass, boxed up for observation and tampering, but not part of the self. Expert participants used words to describe a lack of human presence in an area included "untouched," "less developed" or "undeveloped," and "unchanged" by human interaction with the space. An expert participant used the phrase "human traffic" and "invasive species" as detriments to keeping an area pristine:

> "There is very little invasive species, most of it is just native and there is barely any human traffic in there." (32)

While human interaction with the space in nature is one element that defines an area as pristine, many places explicitly mentioned by expert participants as pristine are under the control of the government or military. This fact was acknowledged by experts when they explained the lack of human presence in these areas due to the fact that they are "restricted," "controlled," and "limited" in access and "extremely blocked off" from the public. Expert participants did not use these words to display their displeasure with a lack of access to pristine areas. Instead, some suggested that the government's intervention is positive for creating a pristine environment.

> “Fortunately, the third of the island we don’t have access to [are the areas which are pristine].” (10)

The word “nicest” was used by one participant to describe a positive feeling toward restricting part of the island from the public.

> “The nicest places that he's even pointing out is all controlled by the military.” (26)

The amount of native plants within the space also mattered to participant experts when describing pristine spaces. There is a need to have a certain “proportion” of native plants that create a “good representation” or variety of island vegetation to meet the “criterion” for pristine areas.

> “I think, first and foremost, just the proportion of native plants. I think that, that's kind of my initial sort of criterion on discriminating between pristine versus not, is how many native versus non-native species do we have and are they....That's how I would rank them.” (44)

Some were “impressed” by the size of some of the trees that are “protected” and “sheltered” from outside elements. Cocos Island was also mentioned as being an area with pristine nature (“big trees, canopies”) because “of native plants and I think also some characteristics...I know it has all these different levels of understories. Like, it's the big trees, canopies, and then there's the little, and then there's the shrubs. So, when I think it has all of those different levels, it has a really good representation of native trees.” (17)

Speaking of Mount Lamlam, located toward the southwest portion of the island, one participant says the trees in the area are “old”: “Up here there's still a lot of, well the plants that are still around are old, there are no seedlings or juveniles on Guam anymore.” (13)

As illustrated above, the separation of self from the environment is characteristic of a dualistic perspective. There are obvious differences from members of the public who are part of

traditional communities and experts who work for Western or Western-style institutions when perceiving the value in maintaining a healthy environment. The separation of values has been seen in similar studies of communities that have experience social and cultural changes due to Western influence (Milstein et al., 2011; Milstein, 2011), highlighting the importance of understanding value differences within diverse populations that inhabit the same space. This study adds to previous work by highlighting differences between expert and public perceptions of the environment.

**Disappearing livelihood**

Nature plays an extensive role in some participants' lives providing sustenance. Many participants mentioned specific, regular interactions in which nature provides a means of nutrition or way to make a living – this reliance on nature may be one of the driving factors behind some participants' mutualistic cultural perspective.

For example, hunting deer and pig are part of regular cultural practices. Hunting these animals has recently become controversial, according to some public participants who regularly hunt. This is due to the restrictions to certain areas on the island by the military, as well as the destructions of some natural spots for more military development. But the act of poaching pigs is common in the community. Some local areas host an annual event called the "pig derby" (Babauta, 2017) in which residents are allowed to hunt wild pigs and harvest them for food or donate the meat. Deer are considered a "cultural animal" by one public participant, after mentioning it is the same vein as the caribou because both were introduced to the island several hundreds of years ago and they "provide" the people with sustenance. The same participant also states these animals are valued because you must follow certain regulations when hunting them:

> "It's kind of controlled. You have to buy a tag, you have to have a hunting license, you have to be in certain areas with certain weapons." (25)

Yet, these restrictions are becoming stricter as the military moves to make more hunting areas inaccessible to the public, according to participants who hunt, to eradicate some of the non-native species on the island. However, participants suggest this impedes on their rights to use land that belongs to Guam's people:

> "At some point [the military is] going to have to be challenged. It's actually law. It says the resources here on the land, even though the military is controlling the land, the resources belong to the people of Guam." (25)

Public participants' growing dependency on federal government permission for access to Guam's resources and land has left many unhappy. Efforts made to communicate with the military bases have been met with silence, leading to a disruption of cultural practices, and signifying its diminishing presence on the island.

Those who rely on hunting to support their livelihood are not the only ones feeling the impact of environmental changes on the island. Plant species play a large role for traditional communities. For example, the coconut tree has a long history of providing nutrition through food and tuba – a palm-derived wine or oil. The coconut trees and other palm species are also part of the practice of roof thatching. A few participants from both groups described an annual festival in which they celebrate the palm trees on the island. As expert participant expresses, "it's part of our life":

> "We use it for weaving, we can make rope with coconut, you know, the coconut husk. There's so much we can do with a coconut, and it's part of our life, part of our culture, to see us have an island without it's very sad." (47)

A main concern for many participants is importance of the palm trees for tourists who wish to see a tropical landscape. Tourism is one of Guam's largest industries, bringing in over 1.5 million visitors spending approximately $1.5 billion in 2016, a record-setting year (Tourism,

n.d.). The number of visitors grew a little over 3 percent in 2017 (Borja, 2017). Besides the large economic revenue tourism brings in, the industry also sustained 34 percent of the island's jobs and added 650 new jobs in 2016 – a large number for a small island (Tourism, n.d.). Most participants stated tourism is one of the largest industries on the island: "That is our...that is what brings our money in actually. It's tourists." (31). Therefore, is makes sense that many participants – experts and public – perceived the imagery of the island as directly linked to the tourist industry's success.

> "I mean it's hard to imagine a tropical island without coconut trees." (15)

> "The tourists come to see our cultural stuff, and a lot of it [focuses] around the coconut and coconut tree. You can get coconut milk for the food, but you can't [get] coconut leaves, you know?" (47)

The imagery of the island was linked with the coconut rhinoceros beetle's impact on coconut trees. Again, participants from both groups used words such as "ugly" and "beautiful" to describe the impact of the nonnative species and feelings toward the island respectively.

> "I also believe [coconut rhinoceros beetles are] gonna hurt the beautification process on the island, which is tourism is one of our biggest things here. And you know the coconut trees are all being cut down and they're all dying or they look ugly. It may affect tourism a little. Just what we have to offer here. Our beautiful island is being ruined by that rhino beetle." (48)

Another participant suggests Guam's nature used to be the provider of sustenance, but since the coconut rhinoceros beetle's arrival, they now rely more on grocery stores where they must buy coconut milk instead of plucking from the trees in their back yard. Respondents expressed

concern about this switch because it is further separating communities from the environment. Moreover, concerns were voiced with language suggesting uncertainty.

> "All the trees, you go around the trees, they're all destroyed. I don't know how we can bring back the coconut without that rhino beetles. Right now, we're depending on the stores, to buy coconut milk. We don't get it any more from the coconut tree." (22)

Other concerns related to palm tree species (e.g., coconut palm trees, betel nut trees) include betel nut. This nut is commonly chewed, similar to tobacco, in a cultural practice common throughout Pacific islands.

> "Pretty soon we're going to have no more betel nut trees. The coconut trees already. The fat on them is already gone just about." (26)

Another example of participants' livelihood affected by environmental change is the traditional practice of medicine making executed by suruhanas. Examples of plants with medicinal properties brought up by participants include coconut palm trees and rosemary, which is a "wonderful plant" that is "medicinal and herbal;" however, it is being used by Westerners as seasoning on chicken. The mixture of Chamorro culture and Western culture appears to worry participants involved with medicine making. Western culture is seen as a cultural hazard to traditional Chamorro practices. One participant told a story about leaving her plants with her family members while she was away for three months. When she returned, her plants were dead:

> "I cried because when I got home my herbs were all dry. I wasn't around or my better half wasn't there to attend to it because he went on his own; he stayed at the beach and camped or whatever. My grandkids didn't care about it. So, it's sad." (30)

These same participants were not only worried about their families' apathy toward the practice, but the lack of plants in nature due to nonnative species. This has lead one participant to refuse to make medicine for clients.

"Oh yeah. I don't like to cook medicine if not complete. Useless." (29)

"You need all the ingredients." (Moderator)

"You just wish your.... Incomplete medicine is not right." (29)

Some participants believe that the disappearance of some of the medicinal plants will lead them to have to pay for their missing ingredients. They fear this could lead to the end of their traditional, cultural practice.

"And if (29) and I was going to go there to get – to make what we're making –" (30)

"—We have to pay." (29)

"Not only pay, but we're going to finish the medicine because that's practically every other day that we're going to collect." (30)

The experiences shared with us signify not only a cultural practice which is difficult to maintain with the island's environmental changes, but the livelihoods affect by those who wish to live mutualistically with the land. They want to see the land taken care of, so it can provide for them. The land helps keep cultural practices alive, but once the resources linked to the practices disappear, participants seem unlikely to keep their livelihoods afloat.

## Species Discourse

Previous research suggests nonnative species discourse changes between experts and public groups, including different generations (Schüttler, Rozzi, & Jax, 2011). This led to varying perceptions of environmental issues among these groups (Selge, Fischer, & van der Wal, 2011). Previous research has also shown certain language used toward nonnative species, such as words that described militaristic, hostile, and illness-like characteristics (Larson, 2005; Druschke et al., 2016). Just as previous studies have shown, I have found a difference between public descriptions of nonnative species and descriptions from expert groups.

It should be noted that this study's script and moderator chose to use the term "invasive species" when speaking about nonnative plants and animals. Thus, it is not surprising that respondents used this word frequently. Broadly, descriptions of nonnative species across both groups (the public and experts) employed a negative valence to describe nonnative plants and animals. The term "invasive" was regularly used by both groups to describe nonnative species that were associated with, or had contributed to, negative consequences on the island.

**Members of the public**

Much of the language used by nonexperts, or people who are members of the public and have varying interactions with nature, described nonnative species using words with hostile effects. Like other studies where individuals used militaristic descriptions toward nonnative species (Druschke, et al., 2016), most participants described nonnative species with militaristic terms and associated these species with parasitic organisms or illnesses that harm the island (Larson, 2005).

Members of the public were more likely to describe nonnative species with repulsion. One participant compared nonnative species to a flea, stating "they hitched a ride" on an import shipment to Guam. The tangan-tangan was referred to as a "parasitic vine," with the ability to insidiously infest and overtake native plants: "It just creeps up and strangles things all along the way." (18)

The use of the word "colonize" is considered a militaristic term, while "strangling" and "choking out" follow more hostile descriptions. Parasitic descriptions only slightly vary from disease-like descriptions but are carried in the same vein as something that is hard to get rid of and spreads easily.

Coconut rhinoceros beetles were viewed as a more present and visual danger to the island than other named nonnative species. Words such as "devastating" and "dangerous" were used to describe the CRB's effect on the island's palm species. One participant described the coconut

rhinoceros beetle as “multiplying so fast” and another suggested, “The rhino beetle is going to do the worst damage on this island” (26).

Another participant who heavily interacts with the plant life describes a treatment for the infestation of CRBs in palm trees: “The infested ones have to be burned. Cut down and burned” (28).

Some nonexpert participants mentioned other nonnative species but treated their description of them as non-threatening and useful to the island. Deer were mentioned as an animal that was “introduced” hundreds of years ago. While some called the deer “invasive,” the overall perception of the animal was not negative. A few participants considered the deer to have “evolved” with the history of the island since it was first introduced in the 18th century. This led members of the same group to describe the deer as a “cultural animal,” indicating the deer is not a threat to their environment but significant to cultural practices:

> “It's a very cultural animal, just like the caribou because that's another animal that could be considered invasive because it's not originally from Guam, but it was brought here in the 1700s, right?” (25)

Pigs were mentioned far more than deer because they have a larger presence than deer, according to many participants. One participant states she encounters a pig or activities related to pigs every day. Some went as far to say, “it’s their [the pigs’] land” and their overpopulation “invades you.” Again, participants are employing militaristic, illness, and hostile terms to describe their disgust for nonnative species. Pigs are directly described as “feral” or “wild” and considered “destructive,” specifically toward native plants on the island. Their population on the island was described as “getting out of hand.” Another example of pigs providing for the community includes the creation of trails for hikers to use to move throughout the island.

> "It has its pros and cons because although we don't have established trails, a lot of the really good trails and access roots in jungle areas are pig and deer trails. But they're also very destructive. You know, you get into a big .... It's like a network of highways, kind of. And they'll eventually have junctions where there will be pig wallows and stuff and really there's no understory. It's just taller trees and just mud. It's visually obvious." (16)

Other animals mentioned in these groups include cats and dogs, both of which were considered nuisances because they are "uncontrolled" and "everywhere." One participant suggested that when you go for a walk, you "go for a walk with your stick."

Public participants see the nonnative species as intruders, a historically linked perspective towards any being coming to the island. At one point, a participant questioned calling human beings "invasive" but did not explore the thought any further. Use of militaristic, hostile, and disease-influenced terms may be motivated by the history of Guam, starting when the Spanish first colonized the island's people. The historical context may be linked to the knowledge and experiences of the U.S. military and its history, as well as the colonization and occupations from other countries.

**Expert discourse**

While most nonexpert participants focused on coconut rhinoceros beetles, pigs, deer, cats and dogs, and nonnative plant life, the brown tree snakes were only briefly mentioned. Experts tend to talk about brown tree snakes in more detail than members of the public, naming it their "number one culprit" in which the snake is connected to many other of Guam's environmental problems. These details also focused less on culture, and less on militaristic and colonizing terms than participants who are from the public group. One expert member showed more concern for the brown tree snake creating more harm to the environment than how the brown tree snake affects culture practices:

> "I've witnessed personally the scales take all of my fadang trees…and I'm like, 'What is that stuff on there?' For a while we were spraying pesticides on it, but then I was realizing that hey, I'm also polluting the aquifer, too. Then, the ground around it is where we have fruit trees, so am I poisoning myself too? Then, it's in the air. I don't know that spraying this is actually doing a better thing for our family as a whole." (47)

While our script specifically asked individuals to discuss nonnative species, some described their personal feelings toward the loss of native birds on the island. When native birds are mentioned, it is in the context that they are being harmed by the snakes and are "going away." Their lowered population is seen as a "loss" that is "negatively affecting" the forest of Guam. Birds are "disappearing." Once again, the framing of environmental problems aims to focus on the health of the forest rather than the cultural significance of a space. Experts wish to see healthier natural surroundings to enrich a deadening ecosystem. Some participants mentioned they want to see a restoration of bird populations to reverse the damage the brown tree snake has caused the island:

> "I do hope, though, that the snake never gets to Rota because I'm very happy that we have ko'ko' birds running wild and free. That makes me very happy to see that, and I know that the brown tree snake, once you get one there—." (47)

Like public groups, experts did use hostile language to describe nonnative species. Tangan-tangan was described as "choking out" other native and nonnative plants:

> "It seems to choke out everything else, even other invasive plants that are in the area, so its ability to colonize and overtake and choke out native plants seems really bad." (13)

Pigs were considered destructive by experts, who mentioned overpopulation instead of focusing on how the pig is used culturally.

> “I know there's a feral swine problem. They're really destroying the native plants. So, our plants can't recover or reforest because the pigs. The populations – there's just too many.” (17)
>
> “They're very destructive.” (16)
>
> “Yes, they're very destructive. They've not been in check. So, it's an over population.” (17)

Participants also expressed concern with how fast the island has been changed in the past decade since the CRBs’ arrival: “In a matter of just ten years, we see widespread devastation” (13). However, they were not seen as pressing issues, according to an expert: “There is no immediate need to get rid of them right now.” (46)

The pattern of dialogue coming from experts suggests a distant perspective, where their view of nature comes from behind a wall. They are not part of nature but viewing it. Their words suggest people tamper with nature, but they do not belong in an interdependent relationship with it. Similar contrasts in language have been seen in other studies (Milstein et al., 2011) where experts took a different perspective than another group.

# CHAPTER 5. CONCLUSION

This study's purpose is to examine the relationship the residents of Guam have with nature and wildlife on the island and how individuals articulate their concerns about environmental changes through their own accounts. Specifically, this study sought to identify the values placed on Guam's environment – including the island's wildlife, nature, and conservation efforts – from different public and expert groups; and the way these values are communicated.

After analyzing work through grounded theory, patterns began to show discontinuities with Cultural Theory, leading me to expand my theoretical framework to include a discussion of ecocultural concepts such as sense of place and mutualism/dualism to understand the relationships participants had with the island's environment. Members of the public from traditional communities expressed greater degrees of mutualism, made clear through their expressions and stories about cultural practices and the support nature provides for their livelihoods. Many of these participants' livelihoods are in danger due to the environmental changes on Guam, which may end some of these traditional ways of life. While it was clear members of the public interwove the idea of self with the environment, experts' opinions about where person and environment lie became clearer during an analysis of descriptions of nonnative species. Participants who are members of the expert groups described humans and environmental resources as separate entities. While these participants interacted with the environment, they were not dependent on it, nor were their lives interwoven with it.

These findings are similar to those found in other studies focusing on mutualism and dualism, where older, traditional members of communities perceive their selves in a mutualistic relationship with the environment (Debelo et al., 2017). The emotional, cultural, and historical connections participants had in this study were also similar to those found in previous studies

focused on sense of place (Basso, 1996; Carbaugh, 1996; Cantrill, 1998). Last, differences between the experts in this study mirror previous studies describing differences between experts and public in their perceptions of nonnative species (Selge et al., 2011; Estévez et al., 2013) and their relationship to the environment (e.g., mutualism versus dualism; Milstein, 2011; Debelo et al., 2017).

This study highlights the importance of understanding the cultural and human dimensions of environmental issues by focusing on the values of the individuals most affected. This study mirrors previous work suggesting that there are different ways people value their environment. It is important to understand these differences to avoid misunderstandings and conflicts between the public and expert groups. Misunderstandings between various public groups and experts can lead to ineffective management practices (Close, et al., 2011; Warner & Kinslow, 2011). And as environmental changes begin to affect more settings, minority populations with a history of colonialism will become more affected by environmental issues (Adeola, 2001). If policymakers refuse to listen to minority communities' concerns, they may engender backlash and resistance to environmental policies and management (Wald, et al., 2018). Given the importance of effective environmental policy for nonnative species mitigation on Guam, it is imperative to listen to and understand public opinion and how opinions might differ between stakeholders with a more mutualistic or dualistic orientation. This understanding will be vital for future efforts to restore Guam's ecosystem, and to protect other nearby islands.

This study provides a better understanding of environmental values held by varying groups from the expert and public sector, while also examining their perceptions of cultural values based on their view of the place and purpose of the island's environment; however, future research could address several limitations of the existing study.

The interview script was strict and specifically asked about the credibility and trustworthiness of sources and participants' attitudes toward managers and other experts in the field of invasive species. This could be improved by using a semi-structured interview script to create a more natural flowing conversation. To capture more personal experiences in nature on Guam, questions directed at the participants could be based more on specific experiences they have had with wildlife, as well as explicitly asking for descriptions (however, this could make them overthink and "blank" or give answers that would not reflect their own descriptions of nonnative species or issues on the island).

The study focused on a wide range of individuals on Guam (experts from natural resources, educators, recreational hikers, fishermen, hunters, individuals who were in the military, from the continental U.S., the government, Chamorro, immigrants from different islands, male, female, young, middle-aged, elderly). While the original purpose for gathering this data was to recruit residents of Guam who have permanently lived on the island for over 10 years, and from varying backgrounds of expertise on the participant of nonnative species, data was not consistently requested or collected by researchers because this was not one of the major focuses of the major research study. However, having demographic information about the participants (i.e., their age, gender, ethnicity, affiliation with the military, occupation, education level, as well as self-reported level of interaction with the environment, and perceived world views) in the form of a survey, would have benefitted the analysis of this study. Adding another method of data collection would have created triangulation; therefore, strengthening results listed above and providing more insights into the cultural dimension of the environment on Guam.

Many participants mentioned community-based approaches toward conservation issues on the island. Future studies may wish to investigate the revitalization of Chamorro culture to better

understand how the indigenous population wishes to interact with the island to build better initiatives between the U.S. government and its people.

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# APPENDIX A: PARTICIPANT INFORMATION

| Participation Information | | | |
|---|---|---|---|
| **Participant ID** | **Group (Public or Expert)** | **Age Range** | **Gender** |
| **1** | Public | 60+ | M |
| **2** | Public | 30-60 | M |
| **3** | Public | 60+ | M |
| **4** | Expert | 60+ | F |
| **5** | Public | 30-60 | F |
| **6** | Public | 30-60 | F |
| **7** | Public | 30-60 | F |
| **8** | Public | 30-60 | F |
| **9** | Public | 60+ | F |
| **10** | Expert | 30-60 | F |
| **11** | Public | 30-60 | F |
| **12** | Public | 30-60 | M |
| **13** | Expert | 18-30 | M |
| **14** | Public | 18-30 | M |
| **15** | Public | 30-60 | M |
| **16** | Public | 18-30 | F |
| **17** | Expert | 30-60 | F |
| **18** | Public | 30-60 | F |
| **19** | Public | 60+ | F |
| **20** | Public | 60+ | F |
| **21** | Public | 60+ | F |
| **22** | Public | 60+ | F |
| **23** | Public | 60+ | M |
| **24** | Public | 60+ | F |
| **25** | Public | 30-60 | M |
| **26** | Public | 30-60 | M |
| **27** | Public | 30-60 | M |
| **28** | Public | 30-60 | F |
| **29** | Public | 60+ | F |
| **30** | Public | 60+ | F |
| **31** | Public | 60+ | F |
| **32** | Expert | 18-30 | M |
| **33** | Expert | 18-30 | M |
| **34** | Expert | 18-30 | M |
| **35** | Expert | 18-30 | F |
| **36** | Expert | 30-60 | M |

**Participant information continued**

| | | | |
|---|---|---|---|
| **37** | Expert | 30-60 | M |
| **38** | Expert | 30-60 | M |
| **39** | Expert | 30-60 | M |
| **40** | Expert | 30-60 | M |
| **41** | Expert | 30-60 | M |
| **42** | Expert | 30-60 | M |
| **43** | Expert | 30-60 | M |
| **44** | Expert | 30-60 | M |
| **45** | Expert | 30-60 | F |
| **46** | Expert | 30-60 | F |
| **47** | Expert | 30-60 | F |
| **48** | Public | 30-60 | M |
| **49** | Public | 30-60 | M |

## APPENDIX B: STRUCTURED INTERVIEW SCRIPT

Invasive Snake and Bird Extinction Discussion Guide

5 min intro

- Greeting
  - Hello and welcome to this focus group. We really appreciate your participation in this project.
  - Introduction – Part of my research. Introduce all facilitators and observers in the room.
  - Logistics - where restrooms are, help yourself to refreshments, etc...
- Purpose of focus groups
  - The purpose of this research is to better understand your perception of plants, animals, and forests on Guam.
- Ground rules
  - Recording equipment
    - The focus group discussion will be recorded. The tapes will be used to create a transcript of the conversation. Names and personal information will not be used in data analysis or in any of the written research reports. The tapes will be destroyed at the conclusion of this study.
- Individual opinions
  - We are very interested in your opinions. The session is open to everyone, all of your views are important. There is no right or wrong answer.
  - We ask that if you have a comment to make you wait until no one else is talking and that you speak as clearly as possible. It is very difficult to hear the answers when more than one person speaks.
  - We'd like to remind you that your participation in this study is voluntary. There is no penalty for not participating and you have the right to withdraw from the focus group at any time.
  - We will start with introductions; continue with a discussion of experiences with snakes and birds and then move on to a series of questions related to this participant. The survey will take approximately one hour.
  - Are there any questions at this time?

- Brief get-acquainted
  - Participant names, positions (if you have them) and any organization affiliations.

15 min – Experience with the outdoors, natural areas

- Can you identify the areas on your island that have native tree species or are the most pristine?
- What are the characteristics you would use to identify these areas?
- Have any of you been in these areas? What brought you there?
- What types of experiences have you had? Does anyone have a different experience?
- How many of you share that experience?
- What types of wildlife have you seen in these areas?
- Over your lifetime, have you noticed any changes to the trees or wildlife in these areas?

- (If people are speaking about birds.) What do you think has caused the jungle to change?
- (As them to list management challenges) Of the challenges listed here, which ones are you most concerned about? (Rank them individually and then as a group).
- What do scientists/managers say about how the jungle has changed?
- How much to you agree, or disagree, with what scientists say about these changes or challenges? Do you think that any of the impacts/claims been exaggerated or under emphasized, etc.?

15 min – Experience with invasive species

- How frequently do you see invasive wildlife? What do you see? (write the list on the board)
- How concerned are you about these on your island? How concerned are you about these species on neighboring islands? How concerned are you about these species spreading to Hawaii?
- On a piece of paper, please indicate which of the invaders on this list are the most concerning to you? (Rank them from 1-end of scale). Who or what is the top of the list?
- For the top 3 IS listed, what is driving your concern?
- Which species do you think scientists/managers are most concerned about?
- Who do you think will be negatively affected by the continued spread of IS on Guam? on Saipan? Is this likely to impact you or people like you?

15 min - Management preference

- What do you think will happen to the jungle if we don't do anything about IS?
- What do you think about the management strategies that have been used on your island to manage snakes?
- What else should we do to manage IS? What would successful management look like? Are there management strategies that you would strongly oppose?
- How would you benefit from this approach?
- Is there anything that you could do, or are currently doing, to manage IS on your island?

15 min – Trusted sources

- Where do you learn about news or information concerning Guam's plants, animals and environmental problems?
- Do you trust those sources?
- Are there specific individuals or organizations on Guam that you would go to for information about plants and animals or Guam's environmental concerns?
- Why do you trust these individuals or groups?
- Are there specific sources you are skeptical of? Why?

2 min close

Thank you again for your participation. The information you have provided today has been extremely helpful. This information will be used to help us develop a larger public survey on these issues. If you have additional questions about this research we encourage you to ask them at this time. If you have questions about your rights as a participant please contact XXX XXX at XXXXXX@iastate.edu or (XXX)XXX-XXXX.

# APPENDIX C: IRB APPROVAL FORM

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

**Date:** 6/9/2017

**To:**

**From:** Office for Responsible Research

**Title:** Understanding of the role of misperceptions and source credibility in affecting sustainable behavior

**IRB ID:** 17-266

**Study Review Date:** 6/9/2017

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  **Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form.** A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.**

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.